HYBRIDIZATION BETWEEN THE GREAT AND SPOTTED BOWERBIRD *CHLAMYDERA NUCHALIS* AND *C. MACULATA* : AN AUTHENTICATED HYBRID BOWERBIRD (PTILONORHYNCHIDAE).

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Evidence of hybridization in the wild between the Great and Spotted Bowerbirds *Chlamydera nuchalis* and *C. maculata* (Ptilonorhynchidae) is described and illustrated from a Queensland Museum specimen. Another Queensland Museum specimen possibly represents such a hybrid and is also detailed. □ *Bowerbirds, hybrid.*

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The Australo-Papuan Ptilonorhynchidae (bowerbirds) consists of 19 species (Sibley & Monroe, 1990; Frith, 1991; Frith et al., 1995a) and was long considered closely related to birds of paradise, Parasidaeidae, (Gould, 1869; Sharpe,1891-98; Elliot,1873; Gilliard, 1969; Cooper & Forshaw, 1977; Schodde, 1976). Recent studies have demonstrated that the two groups are, however, phylogenetically disparate among passerines (Frith, 1994; Frith & Frith, 1990, 1994 & references therein; Sibley & Monroe, 1990; Kusmierski et al., 1993; Christidis & Schodde, 1992). As they were supposedly related, and polygamous, it was anticipated that hybrids might occur between bowerbird species because such occur between polygynous taxa within Paradisaeidae (Mayr, 1941, 1962; Fuller, 1979). Several hybrid bowerbirds have been reported but none authenticated. A supposed hybrid between the Satin *Ptilonorhynchus violaceus* and Regent Bowerbird *Sericulus chrysocephalus* was represented by a single adult male in the iridescent blue plumage of the former species but with extensive yellow wing patches and tipping to tail feathers apparently expressing Regent Bowerbird traits. This unique specimen, known as Rawnsley's Bowerbird *Ptilonorhynchus rawnsleyi* (Diggles, 1867; Gould, 1869; Elliot, 1873; Sharpe, 1891-98; Iredale, 1950) was the subject of controversy concerning its authenticity (Chisholm,1966); and its subsequent disappearance leaves room for doubt about its origins (Marshall, 1954; Gilliard, 1969). Hybridization must be conceded a possibility, however, between these two closely related (Frith & Frith, 1993) genera.

Two Australian monogamous bowerbirds, the Green *Ailuroedus crassirostris* and Spotted Catbird *A. melanotis*, were reported to have once hybridized in captivity (Iredale,1950), but no specimen apparently exists to confirm the event. In the New Guinea genus *Amblyornis*, the Streaked *A. subalaris* and Macgregor's Bowerbird *A. macgregoriae* abut through the Owen Stanley Range. Schodde & McKean (1973) reported an Australian Museum specimen (No. 026264), lacking a locality as suggestive of "the possibility of occasional hybridization between the two species" (Schodde & McKean, 1973). A second, more convincing, specimen of this *Amblyornis* hybrid was discovered while this contribution was with the editor (Frith & Frith, unpubl. data). The present discovery arose out of a search for an area of sympatry between breeding Great and Spotted Bowerbirds in central east Queensland based on their known distributions (Frith et al., 1995b).

METHODS

In searching for breeding sympatry between populations of the Great and Spotted Bowerbirds, we found both on Braslee Station, c.100km SSE of Charters Towers, where each visited the bower of the other and interacted (see Frith et al., 1995b). Habitat was low open woodland dominated by acacias and eucalypts with vine thickets and an understorey dominated by Currant Bush *Carissa lanceolata*, beneath which most bowers were located. Cryptic canvas hides were erected at bowers of both species and observations and photographs made (Frith et al., 1995b).

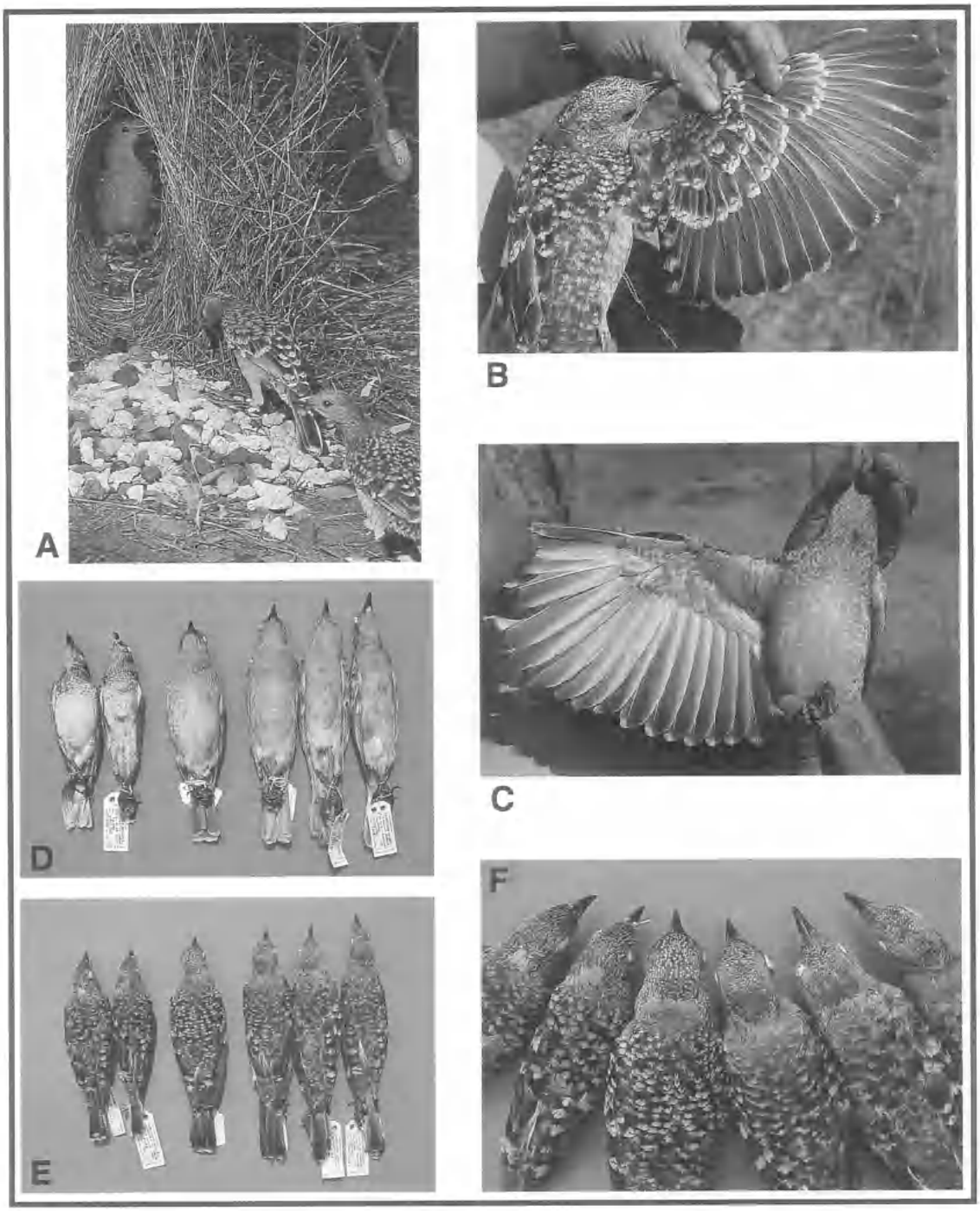

FIG. 1. A, an adult male Great Bowerbird (centre) displays his crown to the male hybrid Great x Spotted Bowerbird here described (rear) as an adult male Spotted Bowerbird (foreground) looks on. B, dorsal & C, ventral plumage detail of the live hybrid Great x Spotted Bowerbird described here, banded with ABBBS band # 081 71976 when caught on 11 September 1991. D, ventral & E,F, dorsal appearance of (l. to r.) two Spotted Bowerbird museum specimens QMO6428 & QMO27263, the hybrid Great x Spotted Bowerbird QMO30059, and three Great Bowerbirds QMO30058, QMO27527 & QMO27576.

TABLE 1. Measurements of a live hybrid Great x Spotted Bowerbird and those of live bowerbirds caught at bowers in the same area of north Queensland with the appearance of typical Great and Spotted Bowerbirds. Measurements in mm.

	Weight	Wing	Tail	Tarsus	Bill	THL
Great Bowerbird[1]						
Mean	205	172	129	47.2	38.5	67.5
Range	(187-219)	(165-175)	(121-134)	(45.1-48.7)	(37.3-39.8)	(66.1-68.4)
n =	6	6	6	6	6	3
Hybrid bowerbird[2]	170	167	124	45.6	37.5	65.4
Spotted Bowerbird[3]						
Mean	138	149	108	41.0	32.6	60.4
Range	(124-166)	(140-157)	(101-120)	(38.1-44.4)	(31.0-36.5)	(57.6-63.4)
n =	31	31	24	18	17	29

[1] Data from three birds at the Bruslee study area and three from Townsville.
[2] Data are the average from the two examinations of the live bird (11 Sept 1991 & 1 Sept 1994) that is now specimen QMO30059.
[3] Data are from 31 birds at the Bruslee study area.

Bird skin specimens examined are in the CSIRO Australian National Wildlife Collection (ANWC) and the Australian (AM), National Museum of Victoria (MV), Queensland (QM) and South Australian (SAM) museums. Capitilized descriptive words for colours are those of Smithe (1975) unless we consider them to be inappropriate, in which case we use uncapitalized words. Colour reference numbers (in parenthesis) are those of Smithe (1975) closest to that being described but not necessarily of the precise colour observed. Colours considered standard for Great Bowerbirds in the part of tropical Queensland concerned (18-23°S and 138-148°E) are taken from a subadult male (QMO30058) collected at the same location as the hybrid, and from adult specimens QMO27575 and QMO27576. Specimens of Spotted Bowerbirds used as standards for comparison with the Great and hybrid specimens are QMO6428, QMO10669,QMO10670 and QMO27263, all in richly-coloured and largely unworn plumage (Fig. 1A).

RESULTS

At one Great Bowerbird bower (bower 'A' of Frith et al., 1995b), we noted Spotted Bowerbirds also visiting, displaying and decorating. On 23 September 1989 and during late September 1990 CBF watched and photographed a bird, considered to be the same individual, that looked the size of a Great Bowerbird but which had a few dorsal feathers the rich cinnamon colour of Spotted Bowerbird plumage and heavy ventral marking and barring. This individual associated with both the bower-owning Great and several Spotted Bowerbirds at the bower to watch and follow them as they decorated or displayed (Fig. 1A).

On 11 September 1991 a bird identified as the same individual was mist netted at the same Great Bowerbird bower, photographed (Fig. 1B,C) and measured (Tables 1 & 2). At that time we thought it to be hybrid but as the possibility it was an abnormally plumaged immature Great Bowerbird remained, we banded and released it (ABBBS band 081 71976). Its pink crest was then one third developed, its mouth yellow and its gape pink-yellow. On 1 September 1994 this individual was again caught at the same bower. At this time the bird, now known to be at least four years old, was fully crested with a flesh-yellow mouth and plumage characters of both Great and Spotted Bowerbirds. As we now had no doubt the bird was hybrid, we collected and prepared it as a skin for the Queensland Museum (QMO30059). It had a fully ossified skull and enlarged (10 x 7mm) gonads.

DESCRIPTION OF THE GREAT X SPOTTED HYBRID BOWERBIRD SPECIMEN QMO30059

The hybrid differs ventrally from adult-plumaged Great Bowerbirds in not having the throat, breast and flanks uniform buff-grey (Light Drab 119C) but a darker colour, closer to Grayish Horn (91), because of the influence of heavy mottling and spotting that develops into barring on the sides of the chest and continues down the flanks and onto the thighs. A few of the most heavily barred feathers to either side of the chest are washed with pale Cinnamon (39) which is stronger on the concealed, basal, part of them. The central abdomen and belly is cream-yellow (54) as in Greats but it extends further up toward the chest as in Spotted Bowerbirds. Undertail coverts and undertail are as in typical Greats but these differ little from those of Spotted Bowerbirds.

TABLE 2. Measurements of Great and Spotted Bowerbird skin specimens from north Queensland localities most near the Bruslee study area in Australian collections and those of a hybrid individual from these parent species.Measurments in mm.

	Weight	Wing	Tail	Tarsus	Bill	THL
Great Bowerbird[1]						
Mean	212	170	132	45.3	37.6	65.3
Range	(175-317)	(162-180)	(125-141)	(42.2-49.4)	(35.2-41.7)	(63.0-70.6)
n =	12	12	12	12	12	5
QMO27590	276	168	125	45.3	38.5	
Hybrid bowerbird[2]	170	167	124	45.6	37.5	65.4
Spotted Bowerbird[3]						
Mean	140	149	112	40.3	32.7	59.6
Range	(117-158)	(144-154)	(101-117)	(36.9-43.1)	(29.9-35.4)	(57.7-61.6)
n =	8	12	12	12	12	9

[1] Specimens are from: 25 km S of Townsville (CSIRO 41509♂, 41510♀, 41513♂), Gilbert River, 74km W of Georgetown (CSIRO 37492♀, 41626♀, 41627♀), near Esmerelda Homestead (QMO27575♂, 27576♂, 27590♂ [possible hybrid - see text]), 18km S of Clermont (CSIRO 43179♂), 31km N of Lynd Junction (CSIRO 43141♀) and 19km NE of Inverliegh Homestead (QMO27515♂).

[2] Data are averaged from the 11 Sept 1991 and 1 Sept 1994 examinations of the live bird that is now specimen QMO30059.

[3] Specimens are from: c.100km NW of Clermont (QMO10669♂, 10670♀), 67km N of Hughenden (CSIRO 43157♂,43158♀), Waverley Creek crossing, Boulia-Mt. Isa Highway (QMO27263♂), Wernading Homestead (QMO27373♀), near Mt. Isa (CSIRO 6621♀, 41756♀, 41757♀, SAMB 20505♀), Collulam Homestead (QMO27303♂) and SW Barcaldine (CSIRO 37321♂).

Unlike adult, subadult and immature Great Bowerbird plumages the hybrid's malar, lore and ear coverts are distinctly mottled with the same Grayish Horn (91) as the throat and breast. Unlike Greats but as typical of Spotted Bowerbirds there is an indistinct but clearly visible pale off-whitish malar stripe (only just apparent in Fig. 1C).

The hybrid is dorsally different from typical Greats of any age. The wings are generally similar to those of an adult Great except that the extensive pale tips to primary covert feathers are not off-white or whitish but are washed with pale Cinnamon (123A) as in, but paler than, Spotted Bowerbirds. The crown feathering is intermediate between that of the two species. The feathers are not simply tipped with pale Buff (124), or whitish as in Greats, or streaked with rich Raw Sienna (136) conspicuously edged with dark grey-brown (119A) as in Spotteds, but are centrally spotted Pale Horn (92) washed to varying intensity, but stronger nearer their bases, with pale (39) to darker (123A) Cinnamon (Fig 1D-F). Crest colour in the hybrid is Rose pink (9) but may be Magenta (2) or be shot with Purple (1) in some light as is true of both putative parent species. Some forwardmost and hindmost crest feathers are tipped silvery-white. Posterior to the crest is a discrete area of contrastingly uniform brownish Glaucous (79).

Mantle, back and rump feathers show characters of both putative parents but are more like those of Spotteds in being more blackish, almost black on the central back, unlike the dark grey-brown (221) of Great Bowerbird back feathers. These feathers on the hybrid do have the broad pale-grey tipping that gives the scalloped appearance of the Great's dorsal plumage but this is rendered inconspicuous by large central feather spotting of the Spotted Bowerbird type of marking. These spots, not as large or symetrical as in the Spotted but nothing like Great plumage, vary in colour from a pale almost creamy off-white (92) to, in few places, the Cinnamon (123A) and rich Mikado Brown (121C) typical of Spotted Bowerbirds (Fig. 1D-F). Table 3 comparatively summarizes characters.

Primary feather colouring and marking is more like that of the Great than the more brownish and extensively paler-marked Spotted Bowerbird. Rump feathers have a conspicuous dark subterminal band typical of Spotteds but not of Great Bowerbirds. Upper tail colour and markings are not discernable from those of Great Bowerbirds. Adult Greats have a clear yellow mouth and Spotteds a fleshy one, the mouth of the hybrid being intermediate between them. Measurements of the hybrid specimen are compared with those of live (Table 1) and skin Great and Spotted Bowerbirds (Table 2).

Mitochondrial DNA study of material from the trunk of the hybrid specimen confirms that the female parent was a Great Bowerbird and the father, therefore, a Spotted Bowerbird

TABLE 3. Some characters of adult Great and Spotted Bowerbirds in central east Queensland compared with those of a hybrid between the two of them

Character	Great	Hybrid	Spotted
Throat, breast & flanks	Uniform light drab (119C)	Greyish horn (91)	Cream-yellow (54) streaked blackish
Abdomen, belly & chest	Cream-yellow (54) but chest light drab (119C)	Cream-yellow (54)	Cream-yellow (54)
Pale malar stripe	Absent	Present	Present
Lore & ear coverts	Uniform light drab (119C)	Mottled Greyish horn (91)	Mottled pale cinnamon (123A)
Pale primary covert tips	Off-white	Very pale cinnamon (123A)	Cinnamon (123A)
Crown feathering	Tipped pale buff (124) to whitish	Centrally spotted pale horn (92) washed pale (39) to darker (123A) cinnamon	Streaked raw sienna (136) & edged dark grey-brown (119A)
Subterminal dark band on rump feathers	Absent	Present	Present
Central back feathering	Dark grey-brown (221)	Blackish	Black
with broad pale scalloping	Present	Present	Absent
and large central feather spotting	Absent	Present	Present
Mouth colour	Yellow	Yellowish-pink	Flesh-pink

(Christidis, pers. comm.; Christidis, Frith & Firth, unpubl. data).

DISCUSSION

Characters in the hybrid peculiar to the Spotted Bowerbird are the pale malar stripe, heavily mottled and barred breast and flanks, sienna-streaked crown and spotted back feathers. Notwithstanding these unequivocal traits, the hybrid is far larger in all measurements than any Spotted, being the size of a small Great Bowerbird (Table 1). Peculiar to the Great is dorsal spotting paler than the rich cinnamon typical of Spotteds. The hybrid is markedly smaller than most male Great Bowerbirds, particularly in weight, (Tables 1 & 2). Its weight on 11 September was 168g and on 1 September 1994 172g. Thus its average weight of 170g is lighter than that of all six Greats trapped at its specific location (Table 1) and that of 12 taken (immediately after collected) over that area of north Queensland (Table 2). Its wing is smaller than most Great Bowerbirds and its tail more so (Tables 1 & 2). From its plumage at the time we are reasonably confident the hybrid bird was at least two, probably three, years old when banded on 11 September 1991. Thus it was at least five years old when collected. These facts and observations leading to the collection of specimen QMO30059 clearly indicate it is the product of hybridization between Great and Spotted Bowerbirds.

Mention should be made of a bird (QMO27590) collected by Julian Ford 10km N of Esmeralda Homestead, north Queensland on 18 September 1986 with unenlarged gonads but a fully ossified 'adult' skull and identified as *C. nuchalis* because it may be hybrid. This tentative suggestion is made because the characters now obvious in the Bruslee hybrid (Fig. 1A) were far less so three years prior to its collection (Fig. 1A-C). At that time its back feathers appeared less black, its whitish primary coverts lacked the cinnamon wash, and its crest was only one third developed.

While QMO27590 has the dorsal plumage of a Great, it has several lower back and upper rump feathers washed with pale Cinnamon (123A) with a dark subterminal band as found in Spotted Bowerbirds. It shows no sign of the pale malar stripe or heavy darker mottling on ear coverts and side of neck typical of Spotted Bowerbirds and present in the Bruslee hybrid, but it is heavily mottled and barred on the throat, chest and flanks much like the hybrid. Notwithstanding an ossified skull, the lack of gonad activity at peak courting season and only one pink nuchal crest feather indicates it to be a subadult. Weight and measurements of Ford's specimen (Table 2) provide inconclusive evidence of hybridization, however, and it is therefore treated here as a subadult *C. nuchalis*. Should both bowerbird species prove to occur where it was collected a hybrid origin becomes, however, a stronger possibility. Hybrids may not always be as obvious as

the specimen recorded here, and may more resemble one or other of the putative parents. Given the potential extent of sympatry of bower-maintaining Spotted and Great Bowerbirds in central northeastern Queensland (Frith et al., 1995b) it is possible that occasional hybridization between the two is more widespread.

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